

- . 1959b. The larvae of the Ampulicidae (Hymenoptera). Ent. News 70: 57-60.
- . 1963. The evolution of prey-carrying mechanisms in wasps. Evolution 16: 468-483.
- . 1964. Further studies on the larvae of digger wasps (Hymenoptera, Sphecidae). Trans. Amer. Ent. Soc. 90: 235-299.
- EVANS, H. E., and C. S. LIN. 1956a. Studies on the larvae of digger wasps (Hymenoptera, Sphecidae). Part I: Sphecinae. Ibid. 81: 131-153, pls. I-VIII.
- and —. 1956b. [Same title.] Part II: Nyssoninae. Ibid. 82: 35-66, pls. II-XIV.
- LECLERCQ, J. 1954. Monographie systématique, phylogénétique et zoogéographique des hyménoptères crabroniens. Liege, Lejeunia. 367 pp.
- MICHENER, C. D. 1953. Comparative morphological and systematic studies of bee larvae with a key to the families of hymenopterous larvae. Univ. Kansas Sci. Bull. 35: 987-1102.
- MUESEBECK, C. F. W., K. V. KROMBEIN, and H. K. TOWNES. 1951. Hymenoptera of America north of Mexico: Synoptic catalog. U. S. Dept. Agri., Monogr. 2. 1420 pp.

Description of the Tanyderid Pupa *Protanyderus margarita* Alexander from Colorado

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On June 15, 1962, the author encountered a pupa, believed to be that of the rare Tanyderid *Protanyderus margarita* Alexander. A sketch of the pupa sent to Dr. Charles P. Alexander elicited the response that it represented a Tanyderid, probably *Protanyderus margarita* Alexander, the only Tanyderid known to occur in Colorado. Apparently there are no accounts of the structure and habitat of the pupa of *Protanyderus*. Adults of *P. margarita* have been reported from British Columbia, Oregon (N. E., Great Basin area, Idaho and Colorado (Alexander, personal communication).

Of two pupae secured, one was found to be in the process of shedding its last larval skin. The partially cast skin was identical with those encountered much earlier (June, 1961) and

already described by Knight (in press) as *Protanyderus margarita* Alexander. The second specimen was in excellent condition and was used almost exclusively in its description.

The pupae were collected about two feet from the north bank of Gunnison River near the Junction of West Elk Creek, Gunnison County, Colorado. The river at the time was somewhat swollen and the actual site would normally be stream-side shore area. The pupae were found on a sand and gravel substrate among small stream-side growths of willow. The water velocity in the vicinity was very low.

I thank Dr. Charles P. Alexander for his opinion on the identity of the pupa and for his very generous supply of information pertaining to Tanyderidae, and also Alan V. Nebeker for his assistance and preparation of the figures. Grateful acknowledgement is also made to Arden R. Gaufin, George F. Edmunds, Delbert W. Argyle and Hugh Hogle, for their aid in the field and in various phases of the preparation of this paper.

DESCRIPTION OF THE PUPA

General Appearance: The pupa superficially is similar to that of *Eriocera*. The female pupa (Figs. 1-4) is 10 to 11 mm long with a greatest width of about 2 mm and a maximum thickness of 1.9 to 2 mm.

Head: The head (Figs. 2 and 4) has two conspicuous frontal horns or frontocornua that bear frontocornual setae which arise about midway on the horns and extend dorsally and somewhat beyond the tip. Three lateral epistomal processes or epistomacornua project outward just ventral to the frontocornua. The medial frontocornu appears to be borne on a protuberance and curves slightly ventrad, tapering apically. Lateral epistomal setae project from their basal origin on the lateral epistomal processes (Figs. 2 and 4). The dorsal region of the head has two pair of chalaza processes. The anterior and posterior parietal papillae each bear a parietal seta. The preorbital setae are borne on a slight chalaza and appear superimposed upon the eye. The prefrontal setae are borne on slight protuberances located medially from the preorbital setae. The genal process



Fig. 1

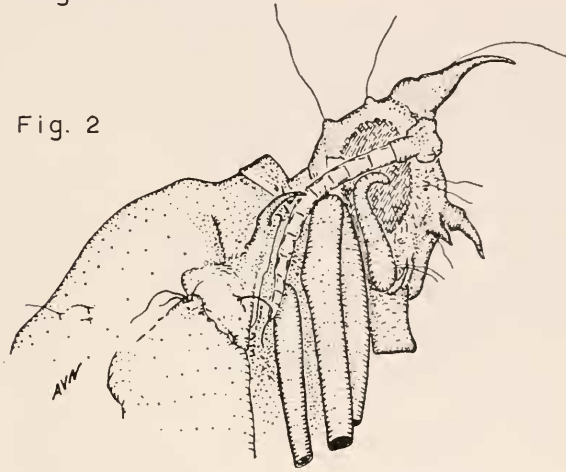


Fig. 2

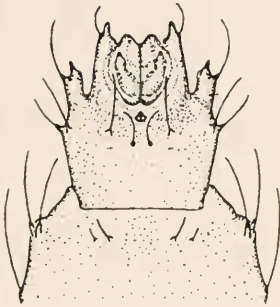


Fig. 3



Fig. 4

FIGS. 1-4. Pupa of female *Protanyderus margarita* Alex.
 1. Lateral view of pupa. 2. Lateral view of anterior region. 3. Ventral view of the terminal abdominal structures. 4. Frontal view of head.

also bears a pair of subgenal setae (Fig. 2) projecting from behind the maxillary palpus. The antennae lie back over the ocular areas and the tips of the maxillary palpi appear to angle forward along their contour. The antennae continue dorso-ventrally, passing ultimately dorsal to the forelegs. The small process just ventral to the epistomal process is, according to Crampton (1930), probably the mandibles. The galeae, small protuberances on the maxillae, are not figured because they are covered by the legs. The maxillary palpi are bent upward and along the contour of the antennae. The labial palpi are rectangular, slightly divergent, and lie below the labrum. The tips of the labial palpi are rounded structures immediately inside the labial palpi sheaths.

Thorax: The pronotum is divided into an anteppronotum and a postpronotum as in *Protoplasia* (Crampton, *ibid.*). The pronotal breathing horns arise just ventrad of the postpronotum and extend forward with the tips ultimately lying on the antennae. The forelegs are shown in Figs. 1 and 2. All of the leg-pods lie parallel to one another with the fore pair being the shortest and the hind pair extending furthest anteriorly.

The scutal region of the mesothorax bears two anterior and one posterior seta on each side. The tegual region bears three setae. The basalar lobe bears a conspicuous seta on a protuberance with two small, barely discernible setae near the base of the protuberance. The postpronotal setae just in front of the breathing trumpet in *Protoplasia* were not discernible in *Protanyderus* (Crampton, *ibid.*). The venation of the wing cases was not complete enough to show a pattern. Each prehalteral lobe bears three bristles. The metanotum also has a pair of setae just dorsal to the prehalteral lobes.

Abdomen: Each tergum has an anterior and a posterior region, bearing, respectively, the anterior and posterior tergal setae. Two anterior tergal setae are borne on small bifurcated chalaza-like protuberances and five setae appear to arise from the area of the origin of the bifurcation in the protuberance. The posterior tergal setae are borne on nearly conical protuberances. The pleural region has a raised area that bears

one anterior and three posterior setae. The spiracles on segments 1-7 are on the pleurites, those on segment 8 are located posteriorly and just dorsad of the base of the lateral process. The sterna have a rather sparse assemblage of setae. There are three pairs of setae posteriorly borne on papilla-like protuberances which are progressively more developed posteriorly. A pair of minute setae are present near midventrally on each segment. The sterna of the eighth and ninth segments are shown in Fig. 3. The lateral processes of the eighth and ninth project prominently posteriorly and slightly laterally. The posterior portion of the tenth segment also contains the structures referred to as cerci by Crampton (*ibid.*). Just anterior to the cerci lie the papilla-like lobes, which, according to Crampton (*ibid.*), lie on each side of what appears to be the location of the genital opening of the female.

Critical examination of the female *Protanyderus* pupa shows that it differs little from *Protoplasia fitchii* O.S., described in articles by Crampton (*ibid.*) and Alexander (1930). The main differences are that the frontal horns of *Protanyderus* are slender and taper gradually, becoming nearly thorn-like, while those of *Protoplasia* (Crampton, *ibid.*) are stouter and not as sharply drawn out. The prefrontal setae are borne on a protuberance in *Protanyderus* but not in *Protoplasia*. The prehalteral lobes of *Protanyderus* bear three bristles as opposed to one pair in *Protoplasia*. The setae borne on the postpronotum just in front of the breathing trumpet in *Protoplasia* are apparently absent in *Protanyderus*.

LITERATURE CITED

- ALEXANDER, C. P. 1930. Observations of the dipterous family Tanyderidae. Proc. Linn. Soc. N. S. W. 4: 221-232.
- CRAMPTON, G. C. 1930. Some anatomical details of the pupa of the archaic tanyderid dipteran *Protoplasia fitchii* O.S. Proc. Ent. Soc. Wash. 32: 83-98.
- KNIGHT, ALLEN W. Description of the tanyderid larva *Protanyderus margarita* Alexander from Colorado. Bull. Brooklyn Ent. Soc. (In press)